

Ocean Research Report



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Expeditions #9 and #10

r/v REGINA MARIS

Panama City, Panama-Puntarenas, Costa Rica

1 August - October 1978



PORPOISE BEHAVIOR
IN THE EASTERN TROPICAL PACIFIC OCEAN

Cruise Report of
r/v REGINA MARIS EXPEDITIONS #9 and #10
1 August - 1 October 1978

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SUMMARY

r/v REGINA MARIS left Panama City on 1 August for the Galapagos Islands and returned to Puntarenas, Costa Rica on 1 October (Fig.1). During Part I of the cruise (1-27 August), marine mammal sightings were collected en route to the Galapagos Islands and on an opportunistic basis while in the archipelago, since seabird research was the primary focus when amongst the islands (see r/v REGINA MARIS Expedition #9A: Seabird Studies in Relation to the Cromwell Current). During Part II of the cruise (29 August - 1 October), r/v REGINA MARIS was chartered by the National Marine Fisheries Service to test the feasibility of using a sailing vessel (a quiet platform) to study the behavior of spinner dolphins (Stenella longirostris) and spotted dolphins (S. attenuata) - the two species most involved in the tuna-porpoise fishery - and to determine their abundance and distribution within the study area. Cetacean sightings for both parts of the cruise are summarized in Tables 1a and 1b. We began to see spinner dolphins on Part II of the cruise, north of the Galapagos Islands, and diversity of species increased in these waters.

INTRODUCTION

Yellowfin tuna (Thunnus albacares) are frequently seen swimming with schools of spotted dolphin (S. attenuata) and spinner dolphins (S. longirostris). The most widely accepted hypothesis to explain this "bond" is that there is a mutual advantage in finding and exploiting food resources. Because of this association, dolphins are netted in the purse seines of the commercial tuna fisheries, with the result that many die. Recently, more efficient gear and new techniques, required of the tuna boats to reduce

the incidental kill, have greatly lessened the number of dolphins killed.

Much effort is currently in progress to remedy this situation. During Expeditions #9 and #10, the primary objective was to study the behavior of undisturbed (by a fishing vessel) dolphin schools and to determine their distribution and abundance along the southwest boundary of the fishing area (Part II of the cruise).

METHODS

During the first part of the cruise (Panama to the Galapagos Islands), sightings were made on an opportunistic basis. The concentrated search for S. attenuata and S. longirostris began on 29 August as the ship headed north from the Galapagos Islands into warmer waters. The r/v REGINA MARIS averaged approximately 5 knots during the cruise under various combinations of sail and diesel power.

The directional hydrophone loaned to the National Marine Fisheries Service by the Ocean Research and Education Society was tested briefly 30 August 1978. We were unable to hear the large school of Tursiops truncatus around the vessel, even though they were making sounds audible to the ear at the surface. Problems in mounting the hydrophone existed in that the only reasonable place to mount it limited directional listening to a 150° scan along the port side. Plans to use the hydrophone to monitor and stay with a school at night were abandoned.

Environmental data and bathythermographs were taken on a regular basis to be correlated and examined in conjunction with whale and dolphin sighting information.

OBSERVATIONS

Cruise #9

Table 1a gives a summary of whales and dolphins sighted between Panama and the Galapagos Islands (1-27 August). Sea lions were also quite numerous. Each island in the Galapagos archipelago seemed to have its own school of bottle-nosed dolphins (T. truncatus) with some schools having fairly distinct colorations. Feeding concentrations of mixed bottle-nosed dolphins, sea lions, and local birds were observed on several occasions.

Cruise #10

Whale and dolphin sightings are shown in Fig. 1b for Cruise #10 (29 August - 1 October). The vessel headed north for warmer waters and tuna-dolphin schools. Sighting conditions for this period averaged fair to poor. Wind in excess of 15 knots gave us constant problems and, though sailing conditions were good, the wind chop cut visibility and searching significantly. There was also a great deal of rain throughout this period.

White-belly spinner dolphins (S. longirostris) were sighted on 31 August at 1610 about 4 miles away under some red-footed boobies and frigate birds, the sighting cue. The school was approached under sail. At 1650 hours, a few animals with sharply falcate dorsal fins (perhaps spotted dolphins, S. attenuata) crossed the bow, but were not seen again. Meanwhile, the spinners had stayed about 100 yards to port, swimming upwind. As r/v REGINA MARIS drifted, they approached the ship in a somewhat scattered school, but apparently lost interest and moved off slowly, undisturbed and in a fairly tight school. Characteristic "spinning behavior" was observed. Wind forces gradually moved the vessel out of reasonable sighting range. The spinner dolphin school was last seen about 500 yards off the stern at 1740 hours, at approximately 2°12'N, 92°44'W.

We headed northeast of this area in the general direction of Cocos Island and got as far as 5°N and east to 87°W on 6 September. We encountered Steno bredanensis, Pseudorca crassidens, Grampus griseus, T. truncatus, and unidentified small whales in this area. Sighting conditions continued unfavorable with winds between 15-20 knots and rain nearly everyday, so it was decided to move south, searching for slightly cooler water and perhaps less wind. On 10 September at approximately 2°N , 86°W , the wind finally lessened and water temperature dropped below 80°F . Physeter catodon, S. coeruleoalba, and one unidentified dolphin school were observed. The unidentified school was our first encounter with a school we were able to catch up with. Bird signs were favorable and dolphins were sighted, but it proved impossible to catch up with this school as it was moving faster (estimate of 4-6 knots) than the ship (3-4 knots).

We returned to 5°N , 85°W and sighted only S. coeruleoalba and T. truncatus. From the Cocos Island area to coastal Costa Rica (9-24 September), sighting frequency improved, especially in the calm coastal Costa Rican waters. On 18 September, a school of spotted dolphins was seen moving upwind to starboard, and to follow them we had to motor. Upon starting the engine, the school quickly took off and then slowed, but we were unable to keep up with them at a vessel speed of 5 knots.

The final week was spent along the Costa Rican coast, roughly from the Gulf of Papagayo to the Nicaraguan border. This area was the best as far as weather and abundance of cetaceans. Although there wasn't enough wind to permit approaching schools under sail, the spotted dolphins off Costa Rica were unaffected by vessel noise (engine, etc.). Animals or schools we encountered included S. attenuata, D. delphis, G. griseus, T. truncatus, and numerous unidentified small whales. On 27 September at 1300 hours, we discovered a large coastal spotted dolphin school. The school was inactive and scattered over

several square miles. It consisted of numerous subgroups of up to 20 animals. Our best estimate was 500 animals in total. Several passes were made through various subgroups and although the animals were clearly visible bowriding and responding to the vessel's presence, undisturbed subgroups remained just out of observation range. Observed behavior thus consisted of animals responding to our presence. Distant observable behavior included typical lobtailing, leaping, side slapping etc. Bowriding animals and subgroups close to the vessel occasionally chased each other and displayed acts of aggression. One animal was seen pushing a small piece of driftwood with its dorsal fin. Several cow-calf pairs were seen with this school and at one point, a group of 6 animals composed of 3 cow-calf pairs were seen bowriding. Observations of this school ended at 1600 hours. The following day, we encountered similar schools and subgroups of S. attenuata in the Gulf of Papagayo. During sighting periods, subgroups of 10+ animals came close and rode the bow wave while others kept their distance. Observation or sighting periods of these scattered coastal schools of spotted dolphins lasted an hour or more.

One school of whitebelly spinner dolphins displayed a great deal of "spinning behavior". While "spinning" is a normal part of the behavioral repertoire of these animals, being chased and captured by a tuna-seiner appears to repress some of this behavior pattern. Furthermore, spinner dolphins approached r/v REGINA MARIS, which was under sail at the time, suggesting that engine noise may be the cue used by dolphins in evading capture during fishing operations. Some further evidence for this came later in the trip, when after making an approach to a school of spotted dolphins while we were under sail, it was necessary to start the engine to follow the animals as they were moving upwind. Immediately

after the engine started, the entire school leaped out of the water and began swimming away from us upwind. The school was at least $\frac{1}{4}$ mile from the ship when the engine was started. We were unable to keep pace with this school.

Another set of valuable observations concerned a school of Delphinus that was associated with tuna and birds. During approximately one hour of observation on this school, the following series of behavior patterns were noted repeatedly.

Birds began to break up and decrease the frequency of their feeding dives. Many birds then landed on the water and drifted quietly. During this period, the dolphins milled about with frequent leaps and a lot of splashing. No tuna could be seen during these periods. Suddenly, the tuna reappeared at the surface, cutting rapidly through the water with their dorsal fins often exposed. Simultaneously, all the birds became airborne and made dive after dive. In many instances they followed tuna near the surface. The dolphins also entered the tuna school and appeared to feed. Finally, the tuna disappeared again and the birds and dolphins became quiet. On several occasions, the tuna moved away from the drifting birds and dolphins and upon resurfacing 100-200 yards away, were soon rejoined by the birds and porpoises. During the entire period of observation, the tuna were obviously leading the dolphin school, the front of which was often 25-100 yards behind the visible part of the tuna school.

The coastal spotted dolphin schools also provided some interesting observations. These schools were widely scattered and were composed of quite tightly associated groups (0-10 animals) and lengths interanimal distances composed of 5-15 animals. Thus, there were small aggregations of animals separated from other groups by hundreds of meters. The entire school probably covered an area of 5-20 square miles. When the

vessel approaches under power to within $\frac{1}{4}$ mile or less of a group, the animals began to move slowly so that they ended up in the path of the ship. Each group then spent several minutes riding the bow or swimming along with the vessel. Aggression was common during periods when animals were bow-riding.

CONCLUSIONS

This cruise was designed to test the feasibility of using a sailing vessel for the study of dolphin behavior. The use of a sailing vessel eliminates the problem of engine noise and allows one to approach a dolphin herd. Once the approach has been made, however, it is often impossible to stay with them, since they frequently move upwind. Large, spread-out schools of dolphins were difficult to observe as they covered such a large area that behavioral observations were restricted, except for the closer animals and subgroups.

The major problem encountered during this trip was weather. The high winds severely limited our ability to sight and observe dolphin schools. The several observations of dolphin schools that were successful provided some worthwhile data. Detailed/complete lists of cetaceans sighted during the cruise can be obtained from the Ocean Research and Education Society.

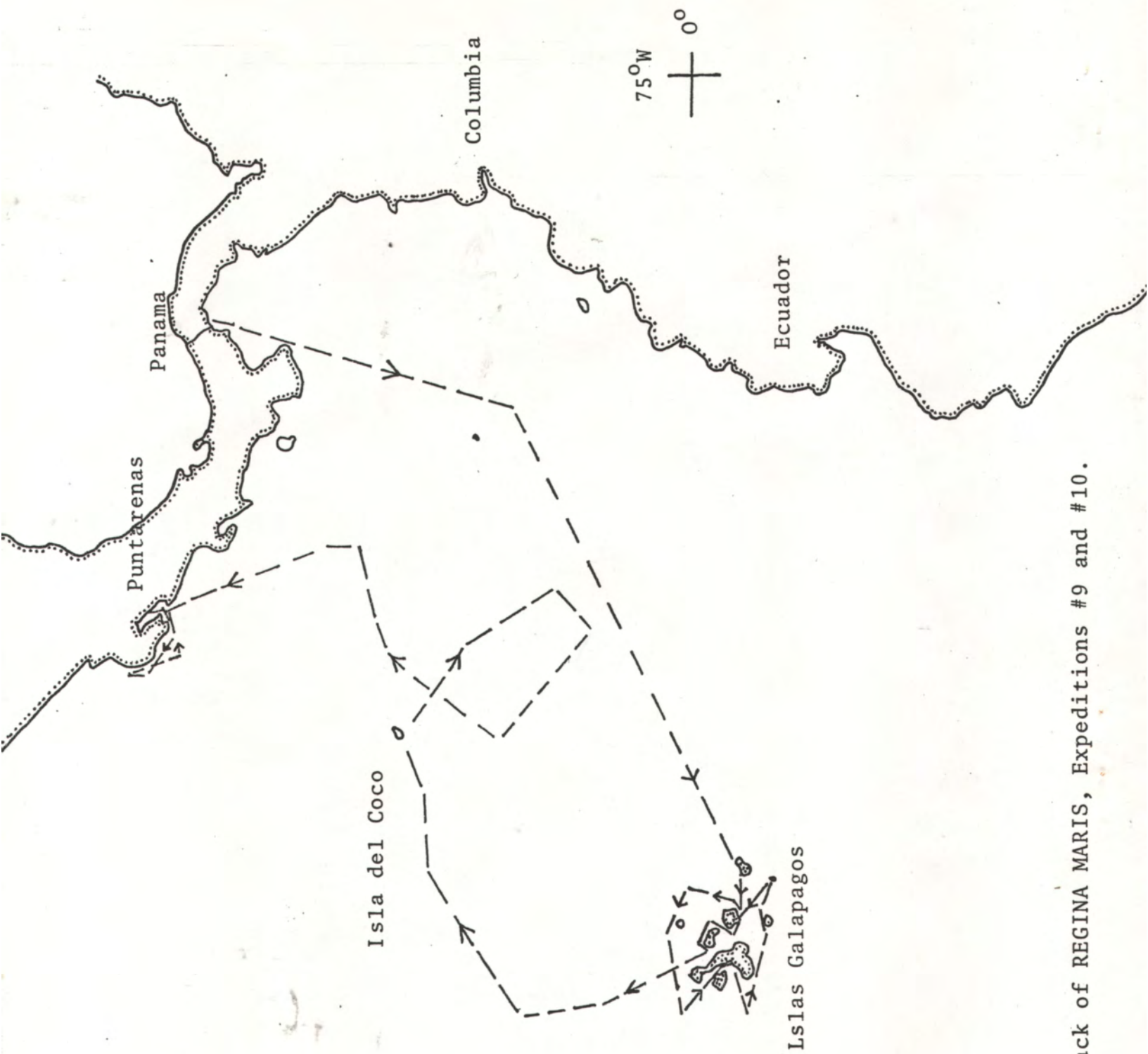


Fig. 1. Cruise track of REGINA MARIS, Expeditions #9 and #10.

Table 1a. Summary of cetacean sightings, Expedition #9, 1-27 August 1978.

Species	No. of Sightings	No. of different days seen	group size range
<u>Delphinus delphis</u>	4	4	3 - 100
<u>Tursiops truncatus</u>	23	8	2 - 75
"Dolphin"	9	6	1 - 200
<u>Globicephala macrorhynchus</u>	2	2	1 - 15
<u>Orcinus orca</u>	2	1	1 - 5
<u>Physeter catodon</u>	3	3	3 - 10
"Rorqual"	4	1	1 - 2
"Large whale"	3	3	1
"Small whale"	1	1	1
"Whale"	2	2	1

Table 1b. Summary of cetacean sightings, Exp. #10
29 August - 1 October 1978

<u>Species</u>	<u>No. of Sightings</u>	<u>No. of Different Days Seen</u>	<u>Group Size Range</u>
<u>Stenella attenuata</u>	6	4	40-800
<u>Stenella longirostris</u>	8	4	6-100
<u>Stenella coeruleoalba</u>	4	4	10-200
<u>Delphinus delphis</u>	2	2	195-400
<u>Tursiops truncatus</u>	9	6	1-150
<u>Steno bredanensis</u>	1	1	2
<u>Grampus griseus</u>	5	4	2-425
"Dolphin"	6	6	1-300
<u>Pseudorca crassidens</u>	2	2	1-2
<u>Globicephala macrorhynchus</u>	1	1	10-15
<u>Physeter catodon</u>	3	3	1-3
"Rorqual"	1	1	1
"Large Whale"	1	1	1
"Small Whale"	12	5	1-14
"Whale"	2	2	1-3

